Benefit/Cost Analysis: Basic Concepts

• Sum Identified Benefits (positive and negative)
  • Inclusive list of benefits and costs
  • Cost/Benefit analysis is intended to measure the positive or negative consequences of a project.
• To evaluate benefits:
  o List all parties/categories of parties affected by the project
    – Add the positive or negative value of the project to each party
    – Benefit = the net benefits
Benefit/Cost Analysis: Basic Concepts

• Risk associated with project outcomes is usually handled with probability theory.
  • Can be factored into the discount rate
  • Can/should be considered separately
  • Risk can be used to weight results

• Uncertainty in assumptions/parameters should be evaluated with sensitivity analysis
  • Monte Carlo
  • Both Benefits and Costs subject to uncertainty
PJM Benefit Cost Analysis

• Market Efficiency Projects intended to address:
  • Energy market constraints
    ◦ Compare Benefits to Costs
  • Capacity market constraints
    ◦ Compare Benefits to Costs

• Total Benefits = Energy Benefits + Capacity Benefits
PJM Regional Energy Benefit Analysis

- **Regional Projects:** 50 percent Change in Total Energy Production Cost + 50 percent Change in Load Energy Payment
- **Change in Total Energy Production Cost**
  - Calculated for the **whole** PJM Region
  - Total change in energy production cost
- **Change in Load Energy Payments**
  - Calculated for each transmission zone
  - Includes only zones that show a reduction in load energy payments
  - Total change in load energy costs **not** considered.
PJM Low Voltage Energy Benefit Analysis

- Regional Projects: 100% of change in Load Energy Payments
- Change in Load Energy Payments
  - Calculated for each transmission zone
  - Includes only zones that show a reduction in load energy payments
  - Total change in load energy costs not considered.
PJM Capacity Benefit Analysis

• Mirrors Energy Benefit Analysis
• Regional Projects: 50% Change in System Capacity Cost + 50% Change in Load Capacity Payment
  • Total system capacity cost
  • Load capacity payments included if lowers cost
• Lower Voltage Projects: 100% change in Load Capacity Payment
  • Load capacity payments included if lowers cost
Issues with Benefit Analysis

• Current B/C Analysis only lists energy benefit to those zones that would benefit from the project
  • Ignores zones that would be hurt by project.
• To evaluate benefits, need to list all parties/categories affected by the project
  • Add the positive or negative value of the project to each party
  • Benefit = the net benefits
Need to account for Risk in Benefit/Cost Analysis

• Cost assumptions in B/C analysis are not subject to rigorous sensitivity analysis
  • One cost estimate used in ratio
  • Does not explicitly account for relative risk of estimate among projects
  • No explicit probability assessment of risks of cost escalation among projects

• Uncertainty in assumptions/parameters can be evaluated with a sensitivity analysis
  • Monte Carlo
  • Both Benefits and Costs subject to uncertainty
Need to account for Risk in Benefit/Cost Analysis

- Benefit assumptions in B/C analysis are not subject to rigorous sensitivity analysis
  - One benefit estimate used in ratio
  - Does not explicitly account for different probabilities (generation build, changes in fuel costs, load change) in ratio

- Uncertainty in assumptions/parameters can be evaluated with a sensitivity analysis
  - Monte Carlo
  - Both Benefits and Costs subject to uncertainty